



FOSSIL ENERGY RESEARCH BENEFITS

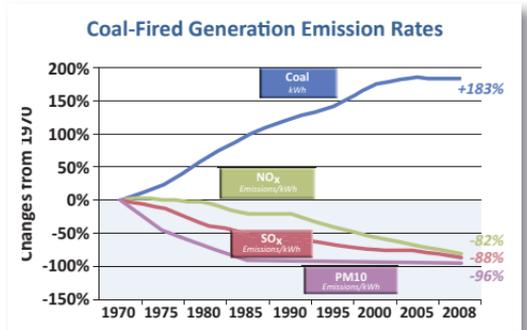
Return on Investment

Since its creation in 1977, the U.S. Department of Energy's (DOE) Office of Fossil Energy (FE) has established a legacy of achievement, return-of-value, and tangible benefits for the taxpayer dollars invested. Some of the highlights include:



Lower NO_x, SO₂ Emissions, Less Acid Rain

Improved **nitrogen oxide (NO_x)** and **sulfur dioxide (SO₂)** control technologies developed through research by FE and its partners have moved into the electric utility and industrial marketplace and now provide a cost-effective way to help meet air quality regulations.

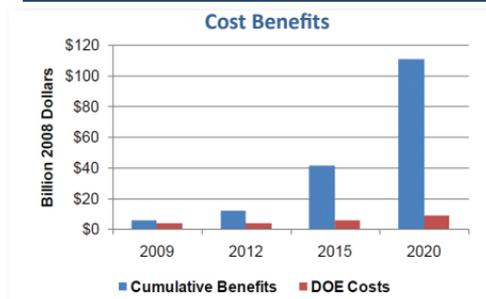


Source: Southern Company



Abundant Electricity Supply, Healthier Air Quality

Wide-scale commercial deployments of **flue gas desulfurization (FGD)**, or scrubbers), **Advanced Selective Catalytic Reduction (SCR)** and **low-NO_x burners**, which combined have helped to significantly reduce harmful emissions. Meanwhile, coal based generation has increased 183 percent since 1970.



Source: Management Information Services, Inc., 2009

Cost Savings, Avoided Environmental Costs, Job Creation



In addition to improving energy production and efficiency, and improved air quality, realize **ancillary benefits** from FE's Clean Coal Technology (CCT) Program.



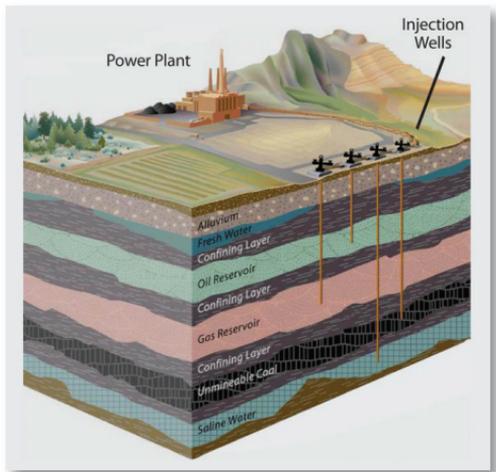
13-to-1 Return on Investment

In a 2009 study, Management Information Services estimated FE's CCT Program would deliver total **monetary benefits** of \$111 billion between 2000-2020, a 13-to-1 return for every taxpayer dollar invested.



Carbon Capture and Storage (CCS) Deployment

Experts believe affordable, commercial-scale CCS technology is an important option in reducing increased atmospheric carbon dioxide (CO₂) emissions linked to global climate change.



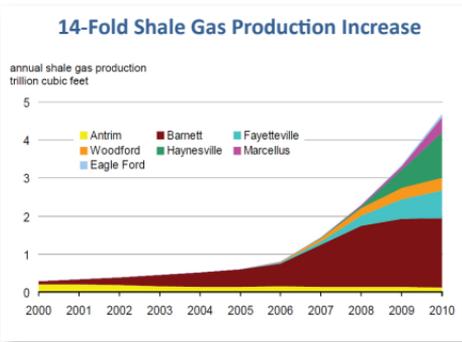
Accelerated Technology Advancement, Knowledge of Geologic Storage

From its inception in 1997, the FE CCS program has invested over **\$785 million** (along with significant private sector funding) to develop pre- and post-combustion capture of CO₂ from electric generation and industrial processes for geologic storage. An additional **\$3.4 billion** from the American Recovery and Reinvestment Act is accelerating the demonstration and eventual deployment of CCS technologies.



Enhanced Gas Shale Production Technologies

FE research helps refine cost-effective **horizontal drilling** and **hydraulic fracturing** technologies, protective environmental practices and data development.



Source: EIA, Uppman Consulting (2010 Estimated)

Increased Domestic Natural Gas Supply

U.S. shale gas production grows **14-fold** between 2000–2010 and reserves triple. Shale gas, combined with production from coal bed methane (also advanced by FE research) and other unconventional resources, now account for **46 percent** of U.S. production.

